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ABSTRACT

Applied research is supposed to take the perspective with the highest degree of corroboration as a basis for action. The realm of organizational perspectives is characterized, however, with a multitude of competing research programs, seldom tested against each other. Epistemological and methodological issues overwhelm inquiry in applied research. This report reflects the major topics of the theory of knowledge in relation to organizational perspectives. Since a rationale for selecting among perspectives is needed, it is argued that the falsificationist approach is better than any other theory of knowledge for overcoming the major problems of the domain. Analysis, diagnosis, design, and implementation are the successive stages of the organizational change process. Design-oriented research, testing the developed design in comparable organizational situations, is compatible with the positivist approach to science. It is also stressed that researchers may enhance the impact of their work by taking into account criteria of usefulness and clarity. Three schemes (figures) illustrate the discussion. (Contains 40 references.) (SLD)

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Epistemological-Methodological Issues Related to Applied Organizational Research

Otic Research Report 38

R.M. van Meel

Table of Contents page

1 Introduction 1

2 The fundamental problem of science 2
2.1 The demarcation problem 2

3 Fundamental problems related to social science 3
3.1 The ontological-methodological debate: Realism versus Nominalism 3
3.2 The epistemological debate: Anti-positivism-positivism 4
3.3 Voluntarism-determinism: the "human nature" debate 4
3.4 Ideographic-nomothetic theory: the methodologic debate 5
3.5 Summary 6

4 Actual state of debate 7
4.1 Karl Popper: the growth of knowledge by trail and error 8
4.2 Thomas Kuhn: distinction between normal and revolutionary science 8
4.3 Imre Lakatos: methodology of rational research programmes 10

5 Fundamental issues related to applied science 10
5.1 Fundamental research versus Applied research 10
5.2 Applied research: the regulative cycle 13
5.3 Applied science and theory of knowledge 13
5.4 Applied research and organizational decision-making 14

6 Conclusions 16

7 References 18

ABSTRACT

Applied research is supposed to take as a basis for action the perspective with the highest degree of corroboration. Hence, the realm of organizational perspectives is characterized by a multitude of competing research programs, which are seldom tested against one another. The debate in this domain of inquiry seems to be overwhelmed with epistemological and methodological issues. This report reflects the major topics of the theory of knowledge in relation to organizational perspectives. As a rationale for selecting among perspectives is needed, it will be argued that the falsificationist approach overcomes better than any other theory of knowledge the major problems related to this domain. Analysis, Diagnosis, Design and Implementation are the successive stages of an organizational change process. Design-oriented research, putting to test the devised design in comparable organizational situations, is pointed out to be compatible with the positivist approach to science. Finally, it will be stressed that researchers may enhance the impact of their endeavour by taking into account the decision-makers criteria on usefulness and clarity.

1 INTRODUCTION.

"Only when they must choose between competing theories, scientists behave like philosophers."
T.S. Kuhn

Generally speaking, applied research seeks to contribute to the solution of practical problems, mainly experienced by practitioners, using hereby the results of scientific inquiry. Obviously, this type of research is expected to be pragmatic and straightforward from the start. According to the positivist approach to science (Popper, 1979), the best tested theory should be preferred as a basis for applied research. Yet, any new research in the realm of applied organizational research is confronted with a large number of competing research programs, based on different assumptions about people and organizations, about rules of discovery and evidence, and about the relation between theory and practice. Numerous publications in this realm report on attempts to test data against the null hypothesis while, on the other hand, efforts to confront a theory with an alternative theory or plausible explanation are rare (Pfeffer, 1981). In the current scientific discourse, theories are set up against rival theories referring to arguments related to epistemological and methodological assumptions prior to any theory (Hall, 1991; Martinet, 1990; Quinn et. al., 1988; Bahlmann & Meesters, 1988; Grandori, 1987; Camerer, 1985; Galbraith, 1980; Weick, 1979; Crozier & Friedberg, 1977).[1]

[1]Note: Examples: Quinn,J.B., Mintzberg, H., James, R.M., The Strategy Process, 1988, p. 518-524, the arguments in favour of a theory of configuration are chiefly based on epistemological assumptions. Bahlmann, J.P., Meesters, B.A.C., Denken & Doen, een studie naar ontwikkeling en strategisch heroriëntatie van zes Nederlandse bedrijven, Berkenwoude/Oegstgeest, 1988, p. 11, emphasize that the basic questions of organization theory are rooted in fundamental philosophical problems and are reflecting a much broader controversy in science, especially the assault on the dominating epistemology and paradigms of social science.
Grandori, A., Perspectives on Organization Theory, 1987, p. 1-9, Chapter 1 is titled: Crisis of Paradigms, this is perhaps the boldest résumé of the state of the actual controversy in organization theory, to avoid the discussion about the corroboration of the contingency theory Grandori proposes to search for this theory's best interpretation and to extend and develop this theory further from that point instead of testing this theory under the most severe circumstances.

Because a choice between different theories is indispensable, the problem-solving oriented researcher is constrained to define his or her position with respect to this proliferated theoretical domain.

This leads to the somewhat paradoxical situation that applied research - which is postulated to be pragmatic and problem-oriented - finds itself in the middle of an epistemological-methodological debate.
Understanding where and how major current perspectives on organizations differ is a prerequisite to make a purposeful selection among theories in order to devise an appropriate research design.
We adopt the thesis of Burrel and Morgan (1979) that all theories of organization are based upon a philosophy of science and a theory of society.
Because questions about the usefulness of organizational theories, their implicit assumptions, and the implication for applied research can not be answered adequately without reference to the major epistemological issues of science, we first wish to address ourselves to the current state of this debate. In the ensuing paragraphs, the major dimensions of this controversy will be pointed out. Subsequently, a metatheoretical scheme for the classification of the major schools of thought in organization and management theory will be discussed.

2 THE FUNDAMENTAL PROBLEM OF SCIENCE.

2.1 The demarcation problem.

The main issue of the epistemological-methodological debate in science is the question what distinguishes knowledge from superstition, ideology or pseudoscience ?

Since Kant, this demarcation problem became the central problem of theory of knowledge. If following Kant we call the problem of induction "Hume's problem," we call the problem of demarcation "Kant's problem". These two problems can be considered as the source of nearly all the other problems in the theory of knowledge (Popper, 1975).
According to Lakatos' (1976) introduction to this subject, in scientific reasoning, theories are to be confronted with facts, and some of the central conditions of scientific reasoning is that theories must be supported by facts. Now, how exactly can facts support theory ?
One can today easily demonstrate that there can be no valid derivation of a law of nature from any finite number of facts,[2] but we will keep reading about scientific theories being proved from facts.
There is a very plausible explanation for this logical mistake. Scientists want to make their theories respectable, deserving the title 'science', that is genuine knowledge. Since the Enlightment, a scientist, was not allowed to guess: he had to prove each sentence he uttered from facts. This was the criterion of scientific honesty. Before Einstein, most scientists thought that Newton had deciphered God's ultimate laws by proving them from facts.
It was the downfall of Newtonian theory in this century that made scientists realize that their standards of honesty had been utopian and that their conception of science had failed.

[2]Note: This problem is known as the induction problem which was first formulated by David Hume and restated by Karl Popper in: Objective Knowledge: an Evolutionary approach, Oxford, 1979, (1972 First ed.) p.4-13. The induction problem indicates the logical problem that particular observations only allow the formulation of singular factual statements, which do not permit us to draw valid universal statements such as hypotheses or theories. This problem is fundamental for empirical sciences and especially for inductivists who consider observations of singular facts as the basis beyond doubt for theory-building, or in other words as a suitable "criterion of demarcation".

3 FUNDAMENTAL PROBLEMS RELATED TO SOCIAL SCIENCE.

Social science has always been and remains subject to methodological controversy. The outcome of this debate will substantively affect the conduct of social science though in the mean time the misconception could win ground that methodological problems only appear in social sciences.

A closer look at recent developments in natural science reveals that the nature of experimentation, theory, and the aims of explanations have become live issues. The persistence of some of these issues may be illustrated by another controversy. Lakatos (1976) mentions the debate between formalist mathematics and informal empirical mathematics concerning the epistemology of mathematics. In this two thousand years during argument the dogmatics hold that -by the power of human intellect and/or senses- we can attain truth and know that we have attained it. The sceptics at the other hand hold that we cannot attain truth, or that we cannot know if we can attain it or that we have attained it.
According to Lakatos, the correct scientific attitude that may allow to overcome this kind of scientific dilemmas inheres in abhorrence of pretentious 'insights' and respect for conscious guessing, as it comes from the best human qualities: courage and modesty.

3.1 The ontological-methodological debate: Realism versus Nominalism

Over the nature of universal terms a long and sometimes bitter dispute raged between two parties: realists and nominalists.
The anti-nominalistic doctrine is traditionally called "realism" or at times "idealism".[3]
Realists deny that we first collect a group of single things and then label them "white", they say that we call a single thing "white" on account of a certain intrinsic property that it shares with other white things, namely, whiteness. Universal terms are held to denote universal objects, just as singular terms denote singular things. Realism stresses the importance of universals for science. Singular objects, it points out, show many accidental features which are of no interest to science.
Science must strip away the accidental and penetrate the essence of things. The essence of anything is always something universal.

For nominalists universals differ from proper names only in being attached to the members of a set or class of single things.
Methodological nominalists would put their problems in such terms as "how does this peace of matter behave" or "how does it move in the presence of other bodies". Methodological nominalists hold that the task of science is only to describe how things behave, and this is done by freely introducing new terms wherever necessary, or by re-defining old terms whenever necessary. Nominalists regard words merely as useful instruments of description.

The school of thinkers who accept the doctrine of methodological realism was founded by Aristotle who thought that scientific research must penetrate the essence of things in order to explain them. Methodological realists are inclined to formulate scientific questions in such terms as: "what is justice", "what is force". They believe that revealing the essential meaning of these terms is at least a necessary prerequisite of scientific research, if not its main task.

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[3] Note: Popper, K.R., The Poverty of Historicism, p.27, suggests to re-name the anti-nominalistic doctrine "Essentialism", but as in management literature "Realism" is the most common name, we have chosen not to use Popper's term for this doctrine.

Most people will admit that methodological nominalism has been victorious in the natural sciences.
In social sciences we should expect methodological naturalists to favour nominalism and anti-naturalists to favour essentialism.
Methodological essentialists argue that the task of social sciences is to understand and to explain such social entities as the state, economic action, etc.. and that this can only be done by penetrating into their essence. The task of social sciences is to describe such entities clearly and properly, i.e. to distinguish the essential from the accidental but this requires knowledge of their essence. The emphasis on the qualitative character of social events, together with the emphasis on intuitive understanding (as opposed to mere description) indicates an attitude closely related to essentialism (Popper, 1964: 27-31).

3.2 The epistomological debate: Anti-positivism-positivism.

Positivist epistemology is in essence based upon the traditional approaches which dominated the natural sciences since Galileo. The name positivism was introduced by August Comte. The positivist theory of knowledge as such was formulated by August Comte and John Stuart Mill and is rooted in the work of David Hume and thoughts developed during the Enlightment (Von Wright, 1974).
Positivism postulates the doctrine of the unity of scientific method that is the view that all theoretical or generalizing sciences make use of the same method, whether they are natural sciences or social sciences. These methods always consist in offering deductive causal explanations, and in testing them by the way of predictions (Popper, 1964).
According to this view, there is no great difference between explanation, prediction and testing. The difference is not one of logical structure but rather one of emphasis, it depends on what we consider to be our problem.[4]
Positivists differ in terms of detailed approach. Some claim for example that hypothesized regularities can be verified by an adequate experimental research program. Others, like Popper, maintain that hypotheses can only be falsified and never demonstrated to be "true". However both "verificationists" and "falsificationists" accept that the growth of knowledge is essentially a cumulative process in which new insights are added to the existing stock of knowledge and false hypotheses eliminated (Burrell & Morgan, 1979).

The epistemology of anti-positivists in social sciences may take many various forms but it is firmly set against the utility of a search for laws or underlying regularities in the world of social affairs. For the anti-positivist, the social world is essentially relativistic and can only be understood from the point of view of the individuals who are directly involved in the activities to be studied. Anti-positivists reject the stand-point of the "observer", which characterizes positivist epistemology, as a valid vantage point for understanding human activities. They maintain that one can only "understand" by occupying the same frame of reference of the participant in action.
One has to understand from the inside rather than from the outside. From this point of view, social science is seen as being essentially a subjective rather than an objective enterprise. Anti-positivists tend to reject the notion that science can generate objective knowledge of any kind (Burrell & Morgan, 1979).

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[4]Note: Popper, K.R., The Poverty of Historicism, p.133: if we take it to be our problem to find initial conditions, or some of the universal laws (or both), from which we may deduce a given "prognosis" then we are looking for an explanation.
If we consider the laws and the initial condition as given, and merely use them for deducing prognoses in order to get thereby some new information, then we are trying to make a prediction.
If we consider one of the premisses, i.e. a universal law as problematic or an initial condition, and the prognosis as something to be compared with the results of the experiment, then we speak of a test. The result of tests is the selection of hypotheses which have stood up to tests, or the elimination of those hypotheses which have not stood up to them. The consequences of these view are that all tests can be interpreted as an attempt to weed out false theories. As it is our aim to establish theories as well as we can we must test them as severely as we can.

3.3 Voluntarism- determinism: the "human nature" debate.

The question whether human nature is determined or autonomous has arised unexpectedly from the ontological-epistemological-methodological debate in science. The realist-positivist-nomothetic dimension, traditionally the approach to natural science, in search for regularities and laws in the physical world became successful beyond expectation with Newton's theory. This theory explained precisely not only the movement of stars, the movements of bodies on earth, it even explained tides. Once convinced, scientists thought that in the end this theory would explain everything, living organisms included. Physical determinism, as the doctrine that all physical events without any exception are predictable, became the ruling faith among scientists.
It was the downfall of classical physics and with the rise of quantum theory that phycists were prepared to abandon physical determinism for physical indeterminism.
Physical determinism is the doctrine that not all events in the physical world are predetermined with absolute precision, in all their infinitesimal details. This shift from a theory of complete determinism to a theory in which unpredicatable elements can occur meant a relief for psychology and philosophy, as physical laws were no longer evidence against human freedom (Popper, 1979: 207-223).
In the wake of this controversy in natural science the question of the nature of human freedom became an issue for most social-scientific theories. According to the voluntaristic view, man is completely autonomeous and free willed. By contrast, the deterministic view postulates that man and his activities are determined by heredity and environment in which he is located, although the degree of assumed determination differs from one social theory to another.

Insofar as social theories are concerned to understand human activities, they must incline implicitly or explicitly to one or another stand-point which follows the influence or both situational and voluntary factors in accounting for the activities of human beings. Such assumptions are essential elements in social-scientific theories, since they define in broad terms the nature of the relationships between man and the society in which he lives
(Burrel & Morgan, 1979).

3.4 Ideographic-nomothetic theory: the methodologic debate.

Method became since Descartes the royal road to truth in the sense of veritas and adeaquatio intellectus ad rem: the correspondence between fact and proposition (Popper, 1964). Consensus about methodical procedures disappeared during the nineteenth century. This issue became in the twentieth century the object of a heavy methodology controversy.[5]

The ideographic approach, to social science is based on the view that one can only understand the social world by obtaining firsthand knowledge of the subject under investigation. The longest established tradition is that of the Geisteswissenschaften, or "hermeneutic philosophy", which in Germany dates back to the eighteenth century. Central in this tradition are the notion of Verstehen and a continuing emphasis upon a radical differentiation between the problem of the social and the natural sciences.

Max Weber was deeply influenced by this tradition, although in the same time highly critical of it (Giddens, 1976).

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[5]Note: The most extreme position related to this issue of philosophy of science is represented by authors like Paul Feyerabend who argues that the most successful scientific inquiries have never proceeded according to rational method at all. Paul Feyerabend claims that anarchism must replace rationalism and that intellectual progress can only be achieved by the creativity and the wishes of the scientist rather than the method and authority of science, in: Feyerabend, P., Against Method, Thetford, 1984, Fifth Impression, (1978 First ed.), Introduction, p.16-22.

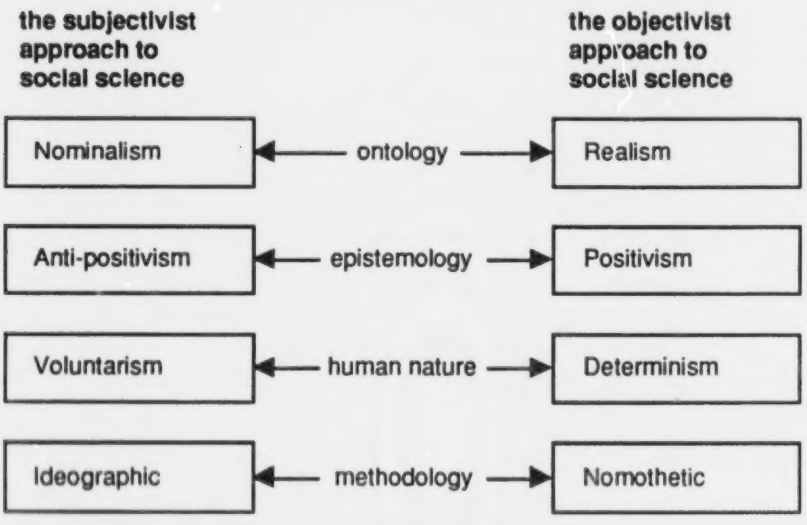
Weber considered his interest in the ethical dimension of human activities as the link between his work and the contributions of Kant (De Vries, 1985). According to this view, knowledge is not a passive mirror of reality, its objects are determined by the way we comprehend them. Understanding or "Verstehen" can in this way, be marked of from explanation since it is concerned with the "meaning", "relevance" and value contained in phenomena, i.e. fundamentally different from merely representing a case of something general. The likelihood of misunderstanding increases with the distance in space and time between speaker and listener (Bleicher, 1987). It thus places considerable stress upon getting close to one's subject and exploring its detailed background and life history. The ideographic approach emphasis the analysis of the subjective-account which one generates by "getting inside" situations and involving oneself in the everyday flow of life -the detailed analysis of the insights generated by such encounters with one's subject and the insights revealed in impressionistic accounts found in diaries, biographies and journalistic records (Burrel & Morgan, 1979).
Understanding is directed at a meaningful totality which itself is always present as its precondition, and of which the subject is already part. In this approach, hermeneutics, or interpretation is seen as a means towards understanding (Bleicher, 1987).

The nomothetic approach to social science lays emphasis on the importance of basing research upon systematic protocol and technique. It is epitomised in the approach and methods employed in the natural sciences, which focus upon the process of testing hypotheses in accordance with the canons of scientific rigour.
It is preoccupied with the construction of scientific tests and the use of quantitative techniques for the analysis of data. Surveys, questionnaires, personality tests and standardized research instruments of all kinds are prominent among the tools which comprise nomothetic methodology.
This nomothetic, sometimes also called positivist methodology is dominating in social sciences, about 50-60 percent of all the research done in this area confines itself to the standard-model (Reuling, 1986), which consists of five stages. Collection and organizing of the empirical information takes place during the *observation stage*, here the scientist is relatively free to organize his/her investigation in the sense that the standard approach has set no logical or methodological rules to be respected. The formulation of hypotheses follows during the *induction stage*, information, questions and conjectures are formulated as hypotheses. During the *deduction stage* testable predictions are deduced from the formulated hypotheses. These predictions are put to test during the test stage in a new empirical situation in order to find out which hypotheses are to be accepted or to be rejected. Typical activities of the *evaluation stage* are the scrutiny of the different steps of the research procedure and the examination of the potential value of the research results (De Groot, 1981).
Methodology has always to state whether it is prescriptive or descriptive. Prescriptive methodology lays down standards which scientists are enjoined to follow. Descriptive methodology sets out the methodology adopted by successful science. A satisfactory methodology must be both, prescriptive and descriptive (Bleicher, 1987).
It is important to emphasize that the ideographic and nomothetic approach to social science differ in all important aspects of description and prescription of successful science.

3.5 Summary.

It has been argued that a rationale for selecting among theories is needed, since the field of organizational research is characterized by a proliferation of theories. Understanding where and how major current perspectives on organizations differ is a prerequisite to make a purposeful selection among theories in order to devise an appropriate research design.

The following scheme, adopted from Burrel & Morgan (1979), enables to categorize the assumptions about the nature of social science.
This overview can be used to distinguish several theories in the field of social science, organizational theories included.



Scheme 1: Overview of assumptions about the nature of social science.
Source: Burrell, C. & Morgan, G. (1979).
Sociological Paradigms and Organizational Analysis, p.3.

This scheme depicts in a rather rigorous fashion the subjective-objective approach to social science. It identifies the four sets of assumptions relevant to the understanding of implicit assumptions of different organizational theories.

At this moment, we are very far from a metatheory that consolidates the various assumptions vis-à-vis the four dimensions antecedent to all scientific work. Though, there are attempts to develop a meta-methodology (De Zeeuw, 1981; Zelditch, 1975) in social science. As we have outlined before, research procedures can be considered as heuristics[6] based on underlying assumption about reality, knowledge and human nature. Therefore, we do not expect any meta-methodology that neglects one of these distinguished dimensions to become broadly accepted.

4. ACTUAL STATE OF THE DEBATE.

Some aspects of the theory of knowledge developed by Karl Popper have already been mentioned in previous paragraphs. Popper's critical rationalism can be considered as a brand of the objectivist approach to social science. A frontal attack on Popper's theory of *growth* of knowledge [7] has been formulated by Thomas Kuhn. Although Kuhn elaborated his theory with in mind the natural sciences, his view became very successful among social scientists.

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[6]Note: heuristic in the sense of a loosely systematic procedure for investigation or inquiry that gives good results eventually and on the whole, but does not guarantee them in any particular case and certainly cannot promise "optimum results" Heuristic is opposed to algorithm and similar to search in Herbert Simon's sense.

[7]Note: Kuhn's and Popper's views of epistemology and methodology are nearly identical, both are united in opposition to a number of characteristic theses of classical positivism, *See also*: Kuhn, T.S., Logic of Discovery or Psychology of Research, in: Lakatos, I., Musgrave, A., (Eds.), Criticism and the Growth of Knowledge, Cambridge, 1980 Eighth ed., 1970 (First ed.) p. 1-2.

In front of the two antagonists Popper and Kuhn, Lakatos developed on the basis of the theory of knowledge elaborated by Popper his view of growth of knowledge through research programmes. Lakatos integrated some elements of Kuhn's vision on this issue, but stressed the importance of rationality for the growth of knowledge.
Because it is far beyond the scope of this introduction to present a complete study of these contributions we intend to propose a brief overview of those elements of the different approaches which may have a significant role in organizational theories and research in this area.

4.1 Karl Popper: the growth of knowledge by trial and error.

Popper's distinction lies primarily in having grasped the full implications of the collapse of the best corroborated scientific theory of all times: Newtonian mechanics and the Newtonian theory of gravitation. In his view virtue lies not in caution in avoiding errors, but in ruthlessness in eliminating them. Intellectual honesty consists in specifying the conditions under which one is willing to give up one's position. Belief may be a regrettable unavoidable biological weakness to be kept under control of criticism: but commitment to any scientific theory is for Popper an outright crime (Lakatos, 1980).

The following propositions resume boldly Popper's theory of knowledge:

1. Science is not a system of certain, or well-established, statements; nor it is a system which steadily advances towards a state of finality. Our science is not knowledge (episteme): it can never claim to have attained truth, or even a substitute for it, such as probability
(Popper, 1975: 1). The quest for justification, in the sense of the justification of the claim that a theory is true has to be given up. All theories are hypotheses; all may be overthrown (Popper, 1979: 29).

2. The method of science is the method of bold conjectures and ingenious and severe attempts to refute them (Popper, 1979: 81).

The falsifiability[8] of a system is to be taken as criterion of demarcation, as it must be possible for an empirical system to be refuted by experience (Popper, 1975: 40-41).

3. The objectivity of scientific statements lies in the fact that they can be inter-subjectively tested (Popper, 1975: 44)

4. From a theoretical point of view non-refuted theories should be preferred because some of them may be true. The theorician will prefer a non-refuted theory to a refuted one provided it explains the success and failures of the refuted one. For practical action, the best tested theory should be preferred as a basis for action (Popper, 1979: 14-22).

4.2 Thomas Kuhn: distinction between normal and revolutionary science.

In his book *Structure of Scientific Revolutions*, originally published in 1962, Kuhn presents a different theory about the evolution of scientific growth. According to Popper science is "revolution in permanence" and criticism the heart of scientific enterprise, according to Kuhn scientific revolution is exceptional and extra-scientific (Lakatos, 1980). In times of normal science an individual scientist tries to connect his own research in the proper way with the corpus of accepted scientific knowledge. Today such achievements are recounted by science textbooks, before such textbooks became popular early in the nineteenth century many of the famous classics of science fulfilled a similar function.

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[8]Note: scientific honesty consists of specifying, in advance, an experiment such that if the result contradicts the theory, the theory has to be given up.

Aristotle's *Physica*, Newton's *Principia*, Lavoisier's *Chemistry*, these and many other works served for a time implicitly to define the legitimate problems and methods of a research field for succeeding generations of practitioners.They were able to do so because they shared two essential characteristics. Their achievement was sufficiently unprecedented to attract an enduring group of adherents away from competing modes of scientific activity.
Simultaneously, it was sufficiently open-ended to leave all sorts of problems for the redefined group of practitioners to solve. Achievements that share these two characteristics are called "paradigms" (Lakatos, 1980).

During periods of normal science, testing of hypotheses in order to attempt to falsify them has a limited purpose. If during the test the hypothesis or conjecture under investigation passes enough stringent tests, the scientist has made a discovery of has at least resolved the puzzle he had been set. If not, he must abandon the puzzle entirely or attempt to solve it with the aid of some other hypothesis. Many research problems, though by no means all, take this form. Tests of this sort are a standard component of "normal science" or normal research, which accounts for the overwhelming majority of the work done in basic science. In no usual sense, however, are such tests directed to the current theory. On the contrary, when engaged with a normal research problem, the scientist must premise current theory as the rule of the game. Under these circumstances the practitioner of such a research tests his personal conjecture. If the test fails, the practitioner is blamed, not his tools. In short, though tests occur frequently in normal science, these tests are of a peculiar sort, for the final analysis it is the individual scientist rather than the current theory which is tested. It is for these normal, not the extraordinary practice of science that the professionals are trained.

Revolutionary episodes are rare in the development of science. When they occur, they are generally called forth either by a prior crisis in the relevant field or the existence of a theory which competes with the existing canons of research. To the aspects of extraordinary research belongs the testing of basic commitments. In normal periods critical discourse is abandoned in favour of puzzle solving. Critical discourse recurs only at the rare moments of crisis when the basis of the field are again in jeopardy.

Only when they must choose between competing theories scientists behave like philosophers (Kuhn, 1980: 4-11). For Kuhn the idea that on "refutation" one can demand the rejection, the elimination of a theory, is "naive" falsificationism. Once a theory has achieved the status of paradigm it will be declared invalid only if an alternate theory is available to take its place (Kuhn, 1970: 77).
Scientific revolutions must be understood as non-cumulative development periods in which an older paradigm is replaced in whole or in part by an incompatible new one (Kuhn, 1970: 92). Scientists are reluctant to embrace a new candidate for paradigm unless they are convinced that two important condition are met. First, the new candidate must seem to resolve some outstanding and generally recognized problem that can be met in no other way. Second, the new paradigm must promise to preserve a relatively large part of concrete problem-solving ability that has accrued to science through its predecessors. To say this is not to suggest that the ability to solve problems is the unique basis for paradigm choice, there can be co criterion of that sort (Kuhn, 1970: 169).
In contrast, for Popper scientific change is rational or at least rationally reconstructable and falls in the realm of the logic of discovery.
For Kuhn scientific change-from one "paradigm" to another- is a mystical conversion which is not and cannot be governed by rules of reason and which falls totally within the realm of the (social) psychology of discovery. Scientific change is a kind of religious change.

4.3 Imre Lakatos: methodology of rational research programmes.

Lakatos approach is an attempt to reconcile Kuhn's widely accepted description of scientific revolutions with the idea of scientific development on a rational basis.
Kuhn's paradigmatic entities are in Lakatos' view scientific research programmes. All scientific research programmes may be characterized by their "hard core" . The negative heuristic forbids to direct our attempts to falsify at this hard core.

Instead we must use our ingenuity to articulate or even invent "auxiliary hypothesis" which form a protective belt around this core, and we must redirect the falsification to these. A research programme is successful if all this leads to a progressive problemshift, unsuccessful if it leads to a degenerating problemshift (Lakatos, 1980: 133). The appraisal of research programmes consists in the evaluation of their heuristic power: how many facts did they produce, how great was their capacity to explain their refutations in the course of their growth? This approach explains why a theory is not always given up after it has been falsified by an experiment. To Lakatos the history of science has been and should be a history of competing research programmes (or "paradigms"), but it has not been and must not become a succession of periods of normal science: the sooner the competition starts, the better for progress. What Kuhn calls "normal science" is nothing but a research programme that has achieved monopoly (Lakatos, 1980: 154-155). Scientific revolutions are not irrational. Rationality implies that each attempt to refute a theory must augment the empirical content of that specific theory. When a research programme fails to integrate new factual proposition this programme becomes degenerating and will finally be abandoned for a more promising research programme (Van Brakel &Van den Brink, 1988).

5 FUNDAMENTAL ISSUES OF APPLIED RESEARCH.

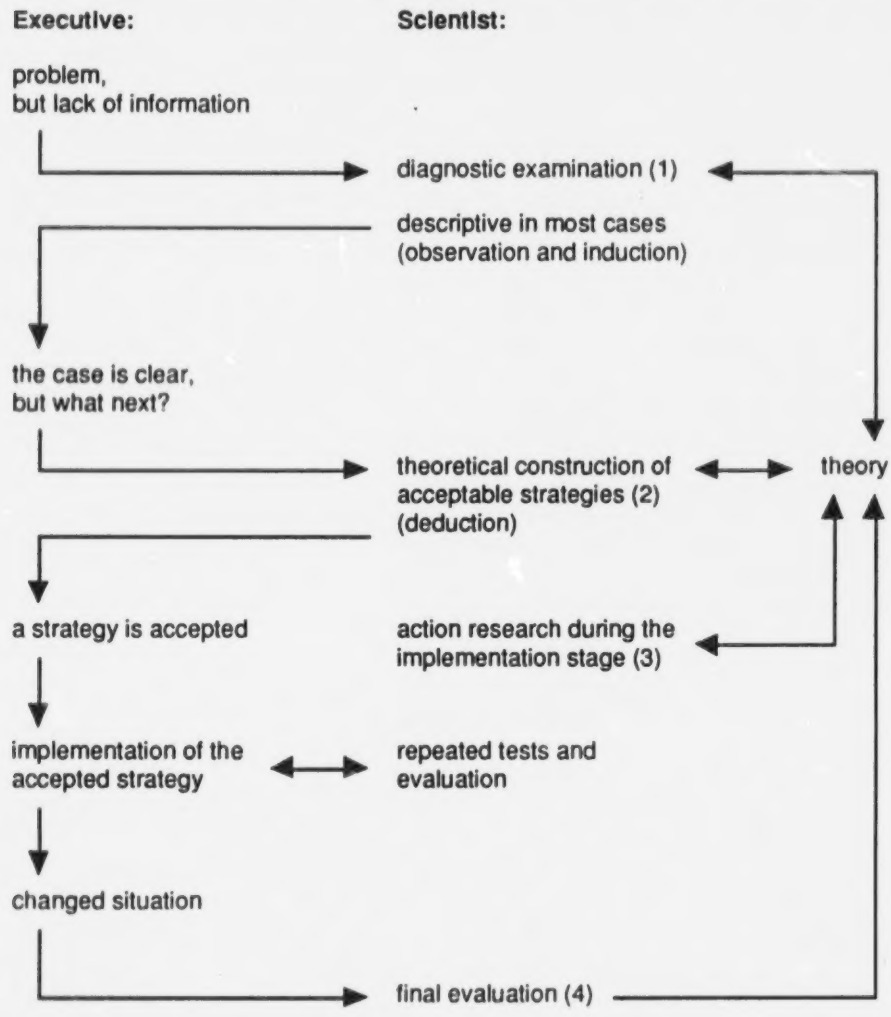
5.1 Fundamental research versus Applied research.

A major problem is considered to be at the origin of nearly all research. We do not begin any research with observations without having a priori in mind a question or a problem (Popper, 1975). A distinction can be made between theoretical problems which are the primary concern of fundamental sciences and practical problems which are the focus of applied sciences.
A brief recapitulation of the nomothetic methodology in fundamental social science permits to acknowledge the relevant elements related to applied science.
As noticed, the primary concern of fundamental research undertaken on purely disciplinary grounds is to solve theory related problems. Consistently with the nomothetic approach the theorician is especially interested in finding the best testable of the competing theories in order to submit it to new tests (Popper, 1979). To test competing theories a variable-oriented strategy is used (Ragin, 1989). This variable-oriented strategy has a clearly identifiable logic of analysis. First, the theory to be tested must be more or less clearly specified in terms of variables and relations. Second, competing explanations of the phenomenon of interest also must be formulated in terms of variables. Competing explanations play an important part in the variable-oriented strategy because tests of preferred theories must be conservative in design; the preferred theory is tested against alternatives.
Third, it is necessary to devise appropriate measures of the variables specified in the various arguments, and the investigator must ascertain the reliability and validity of these measures. Finally, statistical analysis of the relationships between these measures, based on data from a systematically selected set of observations, are used to test the theory against alternative explanations.
Statistical analysis of correlations between variables provide a basis for empirical generalizations. Correlation analysis provides explicit operationalizations about structural processes specified in theories.

The logic behind these efforts to capture the nature of causal relations is based on the assumption that once that the influence of several variables has been explained, causal reactions may be mastered, if there can be found a procedure allowing to manage the detected variables.

The second type of scientific research -applied research- originates from practical problems. A hybrid form of empirical cycle is found here because this type of research must come up to meet practical as well as scientific requirements. Applied scientific research in the field of business administration may be for example investigations about techniques of business administration -as the development of a project management design for a specific organizational setting-, or about the effects of improved working conditions upon output.
The emphasis upon the practical technological approach does not mean that any of the theoretical problems that may arise from the analysis of the practical problem should be excluded. On the contrary, the applied or technological approach is likely to prove fruitful in giving rise to significant problems of a purely theoretical kind.
But beside helping in the fundamental task of selecting problems, the technological approach imposes a discipline on speculative inclinations for it forces scientists to submit their theories to definite standards, such as standards of clarity and practical testability (Popper, 1964). It is worth while to notice that from a methodological point of view as elaborated by Popper there does not exist a demarcation line between fundamental and applied research. In applied research as well as in basic research hypothetical solutions are found by the method of trial and error and should be submitted to tests. For this reason, attempts to justify the scientific nature of applied science (Garner, 1972; Van Strien, 1975), seem pointless to us.

A general description of the cycle of investigation proper to applied social science has been suggested by Swanborn:



Scheme 2: Overview of the empirical cycle of applied research.
Source: Swanborn, P.G. (1987).
Methoden van sociaal-wetenschappelijk onderzoek p. 381.

(1) to (4) exhibit the four aspects of applied social research which can be considered whether as phases of one empirical cycle or whether as four independent forms of research focussing on different facets of the social change process.
The investigator is expected to contribute to the change process by providing during the different stages:

(1) a mere description of the situation, resulting in a diagnosis,
(2) an scrutiny of alternative acceptable strategies, eventually resulting in a design,
(3) a study of the implementation process,
(4) an appraisal of final effects compared to initial objectives.

Categories (1), (2), (3), (4), are only successive stages in one and the same process of organizational change. This has serious consequences for the academic social sciences, where each stage has been appropriated by a separate discipline, with its own set of theories and concepts, methods and techniques.

For example: for *Diagnosis* (1), the discipline is Sociology, with its theories of social problems, social change, and social organizations and its methods of social research, measurement, sampling and analysis. For *Design* (2), it is Public or Business Administration, with their theories of administrative Behavior, methods of policy formation, cost benefit analysis, use of heuristic models, systems and games. For *Implementation* (3), the disciplines tend to be Social Psychology, and Policy Science, with theories of behavioral change, methods of decision-making, group feedback analysis, managerial GRID (Blake, Mouton, 1969), and conflict management. There is a great need in this area for a more interdisciplinary approach (Van de Vall, 1975), because what is required is a perspective that allows to comprehend sufficiently the world of organizations in order to manage change effectively and as efficiently as possible. When it comes to contrive intangible devices, comprehension is a prerequisite, but not in itself a solution. Beyond comprehension, a constructive approach is demanded in this area of scientific inquiry (Martinet, 1990).

5.2 Applied research: the regulative cycle.

Van Strien and other authors like Van Dijkum (1981), put emphasis on the fact that the aim of applied research is problem solving and social change rather than prediction and explanation. Therefore, Van Strien proposes to name the empirical cycle of applied research a regulative cycle as this research seeks to direct a situation towards an end to be attained. Consequentially, Van Strien (1986) pleads for the development of a specific methodology proper for applied research.

Although Swanborn (1987: 392), rejects the necessity of developing different kinds of methodologies, it can not be ignored that the approach in applied research differs in several aspects and requirements from the variable-oriented approach of fundamental research. It is very likely to expect that different applied social sciences as for example business administration, psychology, and pedagogy will develop their own set of research procedures distinctive to their specific domain of interest. If doing so implies the development of a new kind of methodology or not seems, to us, merely a matter of definition.

5.3 Applied science and theory of knowledge.

It may be useful here to analyse some implications of the distinction that in the realm of theory of knowledge is made between the context of discovery and the context of justification.
To the nomothetic approach, the context of discovery is considered as a private matter, as no rules are/or can be set for how to find a new theory (or an adequate solution). The corroboration of a given scientific theory is based on test records of that theory.

Explicit standards and rules have been defined by the nomothetic approach for testing or attempts to confute hypotheses. These activities belong to the context of justification and endeavour to satisfy the demarcation criterion, as described in paragraph 1.1.

In general, applied research will find itself subject to many preliminary conditions as clarity, transparency, feasibility, credibility imposed by the participating practitioners. Taking into account all the unavoidable practical constraints of the real world may prove to be a very difficult part of applied research. Obviously, during this stage, the investigator's freedom of design is restricted as the result of practical requirements imposed by the practitioners/executives.
Scientifically, only the context of justification matters. According to the nomothetic approach, justification of hypotheses means that the proposed conjectural-solution will be put to test in similar and/or modified conditions on the basis of technological predictions.
Generally speaking we may argue that once a problem-solving procedure has led to an acceptable solution, very few executives are interested in the evolving theoretical implications, which are, as a matter of fact, scientifically the most important issues of the accomplished research.

The following scheme summarizes the situation:

Applied research	Context of discovery	Context of justification
Executive guidelines/ requirements	preliminary conditions and situational constraints	feasibility
Scientific guidelines/ requirements	none	test

Scheme 3: Applied research: scientific and practical requirements.

This leads us to emphasize the ambivalent position of applied research which may have to satisfy very divergent objectives.

5.4 Applied research and organizational decision-making.

From an applied research perspective, it is useful to find out what criteria are used by decision-makers in assessing the usefulness of research. If the factors that govern acceptance of research are known, investigators who want to increase the influence of their studies can fashion them in ways calculated to meet prevailing expectations. The quest for this kind of information draws back to 1949, since R. Merton called for a systematic study of applied social science and the factors that facilitated or impeded its use for purposes of practical action. A great number of quantitative investigations on research have been conducted on this subject.
Holzner (1978), has continued the conceptual discussion by suggesting the development of a new subspeciality, a "sociology of knowledge application", Weiss and Bucuvalas (1980), plead for an "interdisciplinary social science of knowledge application". Whereas the classical sociology of knowledge is concerned with the social basis of intellectual productions, a sociology of knowledge application would be concerned with the social consequences of knowledge. It would investigate the conditions under which knowledge is produced, diffused and applied. A sociology of knowledge application should include analysis of those organizational arrangements for knowledge production and use that encourage optimal learning.There is a second ground for our interest in this area. There seems to be a consensus that social sciences is not fulfilling the larger expectations held for it (Moore et. al.,1980; Weiss, Bucuvalas,1980).
Although some of these expectations for the use of social science research are unrealistic[9], there is evidence to believe that research is not being used as widely or as well as it might profitably be.

Because our research aims to make a contribution to practice, it has appeared useful to us, at the beginning of our investigation, to take into account those findings of " the sociology of knowledge application" which may allow to increase the acceptability of the results of our study to decision-makers.

[9]Note: an accurate analysis of these expectations and disappointments can be found in: Weiss, C.H., Bucuvales, M.J., Social Research and Decision-Making, p. 3-26.

The interaction between social science research and decision-making organizations can be conceptualized in three loosely coupled systems:

1. the system that produces social science research;
2. the administrative system that potentially uses social research;
3. the linkage system, the array of institutions and arrangements, the staff and the advisers, whose task it is to transmit information from potential users of research to social scientists about the kinds of research that are needed and to transmit to potential users reports of relevant research that has been conducted.

Obstacles to research use can arise in any, or all, of these realms. Weiss and Bucuvalas (1980) present an overview of the insights provided by the speculative literature on this matter. Our interest is focused on characteristics of research studies as produced by research institutions for these are the only manipulable variables subject to our control. The objective is to learn which features of social research are important in providing credibility and a sense of direction to find out what "useful research" and "using research" mean in practice. The investigation conducted by Weiss and Bucuvalas shows that decision-makers employ the following criteria to judge studies:

a) Relevance to their work;

b) The technical quality, objectivity, and cogency of the study (Research Quality): decision-makers view research studies as more useful to the extent that they meet technical standards of research competence, and they view studies as more useful to the extent that they suggest practical and administratively implementation action.

c) Its plausibility given to their prior knowledge, values and experience (Conformity with User Expectation);

d) The explicit guidance it provides for feasible implementation (Action Orientation); and

e) Its challenge to existing assumptions, practice, and arrangements (Challenge to the Status Quo): Decision makers are willing to take challenging studies into account and believe that they contribute useful ideas and information, but the contribution they make apparently lies more in directing attention to possibilities for fundamental change than in directing change itself.

The analysis has disclosed that potential users of social science research filter the stream of research to which they are exposed through two basic screens (Burrell & Morgan, 1979) *a truth test and a utility test*.. Research that survives the dual review will receive a hearing. Of course, passing the review does not guarantee that research will affect decisions.
Decision makers work in complex systems where many wheels squeak and the supplies of grease are limited. The evidence that research provides is only one source of information, and not usually the most important, with which they deal.
Yet few social scientists are sanguine that decision-makers pay much attention to social science research. What use occurs, they are inclined to believe, is marginal, erratic, dependent upon the particular situation. The suggestion is that the usefulness of research, in their views, is dependent primarily upon the practical guidance for problem solving. Researchers apparently have a simplistic view of the decision-making process inside large organizations, and because they conceptualize decision-making as a series of discrete problem-solving choices, they fail the appreciate the varied contributions that research can make. On the other side, decision-makers are not good at describing their own criteria for useful research. The criteria they report do not correspond well to the criteria they actually apply in judging their likelihood for taking a particular study into account (Weiss & Bucuvalas, 1980).

For applied research, the most important findings in the field of sociology of knowledge are, firstly, research must stand up to a truth test as well as to a utility test. This contradicts the common belief among scientists that practitioners' interest is limited to problem-solving results. Secondly, the decision-making system imposes its own constraints on research use. Decision makers have to face a multitude of considerations, research results aren't but one input among many other sources of information.

In correspondence with these findings De Leeuw (1990) presents an overview of the major rules of thumb for effective management of research projects in Administration. Basically the indicated rules are derived from general concepts of project management which will be discussed in the succeeding chapters of this study.

6 CONCLUSIONS.

What are the consequences of this debate for actual research done in the area of organizational research? Firstly, mainstream research is primarily confined to the objectivist approach to science. Based on the falsification principle, advocated by Popper, broadly accepted investigation strategies have been elaborated. In terms of Popper 's opponent Kuhn, we may conclude that Popper 's view has nowadays become "normal epistemology". Moreover, as we have pointed out, according to the positivist view, theories and their utilization must be formulated so that disproof is possible. Hence, it is common to remark how in the realm of organizational research, the failure of predictions seldom leads to the abandon of the underlying theory, but rather intensifies the search for moderators that could somehow account for the observed data. In other words, instead of negative evidence being taken as a reason to seek for alternative perspectives, negative evidence is often seen as a reason to redouble the effort to maintain the perspective (Pfeffer, 1981; Lakatos, 1980). In this area of scientific inquiry, testing of theories against the null-hypothesis occurs more frequently than attempts to test a theory against an alternative theory. Apparently, a very mild form of falsificationism seems to be retained.
Consistently with Lakatos view, research programmes develop relatively autonomously, but given the state of theory and data, more "revolution" is needed to reject incorrect notions and concepts in order to counteract further proliferation of this theoretical domain.

Secondly, in reference to the assault on the dominating epistemology of science, we have outlined previously that this controversy is related to a fundamental debate in the realm of ontology and epistemology.
Falsificationism which has nowadays become the dominating epistemology of science, pursues to overcome the demarcation problem. According to the positivist view, a critical attitude towards any scientific theory reflects a correct scientific attitude. In extension, this also holds true for all theories of knowledge. Yet, until now, the falsificationists put forward a more objective criterion to distinguish scientific knowledge from all other forms of knowledge than any other knowledge theory. So, from a scientific point of view, the more assaults on the critical rationalist approach, the better. But it should be acknowledged that the real challenge remains to formulate a theory with a greater heuristic power to solve the fundamental problems in the domain of epistemology.

Thirdly, as Kimberly (1981) argues, instead of searching general principles that are universally applicable to all organizations, or at the opposite attempt to capture the uniqueness and complexity of organizations, it may be useful to distinguish classes of organizations that are sufficiently similar within themselves and dissimilar to others to favour the creation of middle-range theories. The contingency theory and later perspectives as the configuration theory can be seen as examples of middle-range perspectives. Thus, the tension between the ideographic and nomothetic orientation can be reduced.

Applied research is expected to meet practical as well as scientific requirements. Consistently with the nomothetic approach, hypothetical solutions are found by the method of trial and error and should be submitted to tests. From a methodological point of view, there does not exist a demarcation line between fundamental research and applied research.

Design-oriented research seeks to develop heuristic models appropriate for organizational settings. In management research case-studies are widely used for this purpose. Testing of a developed heuristic model, in comparable organizational conditions, is assumed to be compatible with the positivist approach.

Finally, there is evidence to believe that research is not as widely used as it might be. From the decision-makers point of view, important criteria to judge the results of applied research are: relevance to their work, plausibility in relation to their prior knowledge and the perceived guidance for feasible implementation. Basically, decision-makers filter the stream of research to which they are exposed through two basic screens: a truth test and a utility test.

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